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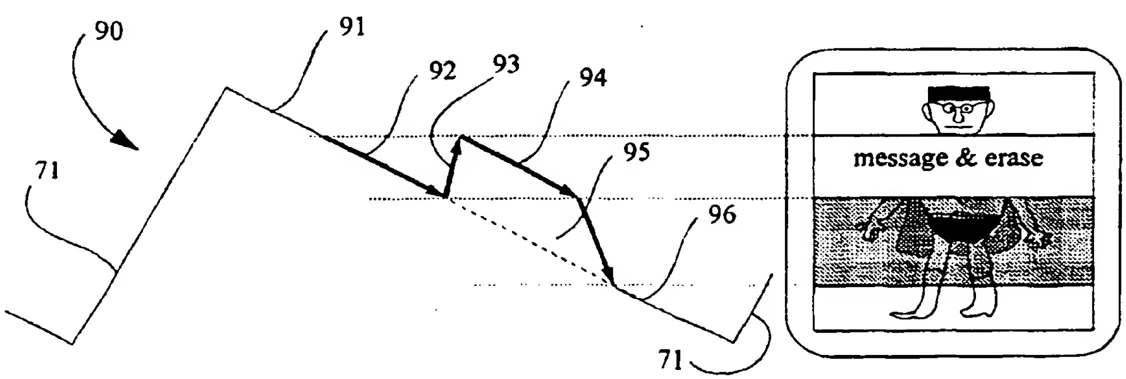

(57) Abstract

A subliminal message display system is disclosed which permits the display of a "subliminal message". The display occurs by switching a programme input video signal (91) during a single field of its display to display a subliminal message (92). A retrace (93) of the rasterised display occurs and an erasure signal (94) is used to erase the subliminal message from display. A downward advance (95) of the rasterised display is forced so as to compensate for display time lost in rendering the erasure signal (94). The programme image signal (96) is then re-enabled. A variety of embodiments are described which permit both the rendering and erasure of a subliminal message within a single display field of a rasterised display.

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SUBLIMINAL MESSAGE DISPLAY SYSTEM

Field of the Invention

The present invention relates to subliminal message communication, and in particular, to a method and apparatus for displaying a subliminal message on a conventional video or raster display.

Background Art

The human mind is thought to be comprised of a conscious part and a subconscious part. Sensory input is first filtered by the conscious mind, before being passed on to the subconscious. The importance of the subconscious mind in the well-being of a person is underscored by the many varied forms of therapy which directly affect the subconscious mind, some of which may be known collectively as hypnosis and meditation. Although still the subject of much research, it has been shown that images and messages which are seen by the human subject only for brief instants may be able to bypass the filtering action of the conscious mind to directly affect the unconscious mind. Therapies based upon this idea can be used to beneficially affect an individual's behaviour. For example, weight loss and weight maintenance programmes can be enhanced through the use of subliminal communication. To be effective, the subliminal message must be presented to the recipient for only a brief duration. Most research suggests that this duration must be no more than 12 milliseconds. The interested addressee may in this connection wish to refer to the following learned papers:

(1) Weinberger, J.; Hardaway, R.; "Separating Science from Myth in Subliminal Psychodynamic Activation", Clinical Psychology Review, Vol. 10, pp.727-756, 1990;

(2) Berry, D.M.; Abramowitz, S.I.; "Educative/Support Groups and Subliminal Psychodynamic Activation for Bulimic College Women", International Journal of Eating Disorders, vol 8, pp.75-85, 1989; and

(3) Silverman, L.H.; Martin, A.; Ungaro, R.; Mendelsohn, E.; "Effect of Subliminal Stimulation of Symbiotic Fantasies on Behaviour Modification Treatment of Obesity", Journal of Consulting and Clinical Psychology, Vol 46, pp.432-441, 1978.

One prior art subliminal message system is a tachistoscope, which is a mechanical instrument with an arrangement of mirrors, lenses and an electromechanical shutter. The human subject generally peers through a viewer at a static image on a card. At some point in time, under control of the researcher or computer control, the shutter is activated which exposes to the subject another card, called the "stimulus card". This exposure is for a very brief and controlled period of time, prior to the original image being restored. Such an arrangement, whilst being found to have some effect, requires the production of precise mechanical instrumentation which is generally expensive. Furthermore, the tachistoscope is inconvenient for use as the subject, when looking into the viewer, is conscious of the fact that a subliminal message will be displayed.

Subliminal messages have also been marketed on standard video tape material.

Typically, the main programme material is some form of natural scenery which is intended to relax the human subject. However, in such arrangements, the subliminal message is displayed for the entire duration of the video frame and, as a result, the message is not totally subliminal, as it can be momentarily read. This is because, even at a rate of 25 frames per second, the persistence of the human eye and its sensitivity are such that bold characters of text are clearly distinguishable over moving scenery and the like. However, unlike the tachistoscope, the subliminal video tape format is desirable as the programme material can provide a sufficient distraction for the subject thereby removing the conscious knowledge of subliminal programming.

Summary of the Invention

It is an object of the present invention to provide an alternative arrangement by which subliminal messages can be presented.

In accordance with one aspect of the present invention there is disclosed a method of displaying a subliminal message to an observer upon a rasterised display, said method comprising the steps of displaying a video source material comprised of a plurality of sequential fields, displaying a subliminal message for a portion of one of said fields, and immediately following display of said subliminal message, erasing said subliminal message from display prior to recommencement of uninhibited display of said video source material. The erasure of the subliminal signal can be performed by retracing the subliminal signal with an erasure signal. Alternatively, if the subliminal signal is of the same interlace as the following field, that portion of the following field corresponding to the subliminal signal is clamped to a minimum illumination intensity sufficient to overwrite, blank out or occlude the subliminal message.

In accordance with another aspect of the present invention there is disclosed A subliminal image display system for reproducing a subliminal message on a display, said system comprising:

a video processor configured to provide an output of said processor system determined from a source material video input signal and a message signal obtained from an image generator and containing said subliminal message;

a video timing detector arranged to extract synchronisation signals from said input signal;

a controller arranged to control said processor to cause display of said message signal in a field of said input signal in a predetermined manner; and

an erasure arrangement configured to erase said subliminal message immediately after display of same.

Generally, the subliminal message can comprise text and/or an image that is displayed.

Preferably, the erasure arrangement comprises a clamp for clamping the video intensity of the source material in the subsequent field of the input signal.

Brief Description of the Drawings

A number of embodiments of the present invention will now be described with reference to the drawings in which:

Fig. 1A shows a timing diagram of signals used in a first embodiment of the present invention;

Fig. 1B shows a timing diagram of signals used in a second embodiment of the present invention;

Figs. 2A to 2E show a frame sequence of images illustrating the visual effect of the preferred embodiment;

Fig. 3 is a schematic block diagram representation of a subliminal message system of the first embodiment of the present invention;

Fig. 4 is a schematic block diagram representation of the second embodiment of the present invention;

Fig. 5 schematically illustrates a prior art vertical sweep circuit of a television receiver;

Fig. 6 illustrates the vertical deflection waveform of the arrangement of Fig. 5;

Figs. 7 to 11 illustrate voltage waveforms of respective further embodiments of the invention; and

Fig. 12 schematically illustrates modifications to the charge/discharge unit of Fig. 5 to enable it to operate to provide the embodiments of Figs. 7 to 11.

Best and Other Modes for Carrying Out the Invention

The preferred embodiments are configured for use in standard video (television) displays whereby the viewing subject can watch normal broadcast or pre-recorded (eg. video tape/disc) programme material whilst being treated with the subliminal message.

A television receiver recreates an image by scanning an electron beam across the face of the screen. A picture is made up of a series of horizontal lines which are transmitted one after another, and which appear below one another on the screen. At the end of each horizontal line, the electron beam is rapidly returned to the beginning of the next line. This is called "line flyback", "line blanking period", or "horizontal retrace". When the bottom of the screen is reached, the electron beam is returned to the top of the screen, ready for the next picture. This is termed "field flyback" or "field blanking period" or "vertical retrace". When the sequence of images is repeated at a sufficiently high rate, due to the persistence of the human eye, flicker between the fields is not perceived, and a smooth image is portrayed.

All the information required to recreate a video image, including, all signals required to position the electron beam, any associated audio signal, and the picture detail itself, is carried within a single signal called the "composite video signal". The timing associated with the horizontal scanning of the electron beam is called the "line time base". In the Australian PAL system, each line is 64 microseconds in length and the composite

video signal maintains this period at all times, even during vertical retrace. A line synchronisation pulse initiates the line flyback which must be completed in about 10 microseconds.

In the Australian PAL system, fields are transmitted at the rate of 50 per second (60 per second for NTSC systems). At the completion of each field, the composite video signal contains specially formed lines, called field synchronisation pulses, hereafter referred to as Vsync pulses, which are detected by a television receiver. Once the field sync pulses are detected, the receiver triggers a vertical retrace, which moves the electron beam to the top of the screen. The vertical retrace takes several line periods to complete (about 25 lines for the Australian PAL system). At the end of the vertical retrace period, the beam has returned to its known vertical position, or vertical origin, regardless of its horizontal position, and can now begin its scan downwards.

In order to reduce the bandwidth required to transmit the composite video signal, interlacing is used in many displays. This means that consecutive lines in the composite video signal actually trace out alternate lines on the video screen. The lines in between are traced during the next vertical scan, or field. This means that adjacent lines on the screen are updated only at half the vertical scan rate, which can lead to localised flicker. It also means that it takes two vertical scans, or fields, to complete the rendering of one image. This is achieved in the PAL and NTSC systems by having an odd number of lines per picture, and by ending each "even field" with a half line whilst starting each "odd field" with a half line. The remaining start and end lines are on full lines.

Referring to Fig. 1A, a timing diagram is illustrated in which signal A represents a composite video signal as received by a television receiver. The signal is divided into a sequence of fields (n, n+1) each of which commences with a field sync signal 2. Following the field sync signal 2 is a programme signal 3 which scans out the appropriate even or odd field.

Still referring to Fig. 1A, the present invention is implemented by replacing a portion of one field of the composite signal 1 with a subliminal message signal 5 as indicated in the trace of signal B in Fig. 1A. Signal B commences with a field synchronisation signal 6 timed to occur at a time T_1 after the commencement of the immediately preceding field synchronisation signal 2, and which returns the electron beam to the top of the display. After the field synchronisation signal 6, a subliminal message signal 7 is scanned which renders onto the video display the desired subliminal message. The subliminal message in this embodiment comprises text, but can comprise an image, or a combination of both. After the signal 7 is completed, as shown in Fig. 1A, a further field synchronisation signal 8 is inserted which returns the scanning electron beam to the top of the screen. At this point in time, an erasure signal 9 blanks out the subliminal message thereby preventing any persistence on the eye of the subject. The duration of one field sync pulse 6,8 plus the duration of one message or erasure signal 7,9 is T_S. T1

is time such that (T_1+2T_s) equals one field period. The result of combining signals A and B in this manner is an output signal 10 also shown in Fig. 1A. It is apparent from the output signal 10 that the subliminal signal 7 and erasure signal 9 have priority over the programme signal 1 for display when it is activated.

Turning now to Figs. 2A to 2E, the sequence of field images as displayed in Fig. 1A is exemplified.

Fig. 2A shows the image at field (n-1) which shows a cartoon character configured in a first position. Fig. 2B shows the same image at time (T_1) into field (n) where approximately 60% of the image has been traced, and the remainder blank (eg. black, assuming no persistence of the phosphors of the display).

Fig. 2C again shows field (n) but at a time T_1+T_s representing the end of the subliminal signal 7 which overwrites the top portion of the image of Fig. 2B.

Fig. 2D shows field (n) at time T_1+2T_s at which time the erasure signal 9 has blanked out the subliminal image.

Fig. 2E shows the image at the end of field (n+1) which displays a full field of the cartoon character in a different position.

It will be apparent from the foregoing that with this method, the duration of the subliminal message as displayed can be closely controlled by means of its size as represented by the number of lines displayed, in view of the display time for each line being constant. Furthermore, the use of the erasure signal effectively erases the subliminal message thereby preventing any persistence upon the eye. In addition, the overall field synchronisation of the composite video signal is not upset as the entire process is contained within a single field such that subsequent fields can be used for normal display.

Fig. 3 shows an arrangement of a subliminal message system 20 which receives an input video signal 21 in the form of a composite video signal. The signal 21 can be derived from broadcast television transmissions, or signals such as those reproduced from video tape, laser disc or within computer devices and the like. The input composite video signal 21 is input to a line and field synchronisation extractor 22 which extracts a field sync signal 23 and a line sync signal 24. These signals are each input to a timing and control unit 26. The timing and control unit 26 outputs line and field timing signals on a bus 35 to an image generator 27, a blanker unit 28 and a field sync generator 29. The input video signal 21 also supplies an even field detector 25 which outputs pulses to the timing and control unit 26 corresponding to the detection of each even field. The timing control unit 26 waits a certain time period T_1 after the last field synchronisation signal 23 is received from the video input signal 21. It then switches a video switch 31 to switch a composite output signal 32 from the input signal 21 to a generated signal 33 output from a further video switch 30. The video switch 30 is supplied with the subliminal signal corresponding to signal B of Fig. 1. The time period T_1 must be exactly

timed so that the two field synchronisation pulses, one subliminal image scan and one erasure scan contained in signal B, are fully completed just when the input video signal 21 is commencing the next field synchronisation pulse.

The subliminal message is placed toward the end of a field of the input signal 21, rather than the beginning, because this results in a minimisation of interference with the standard composite video signal.

If the subliminal message were placed at the beginning, the input video signal 21 would be part way through the next field at the time of restoring the original video after the completion of the subliminal message and will therefore commence writing at the top of the screen. Thus the picture will be seen to jump upwards, giving something similar to horizontal hold fault on the television receiver.

At the completion of time T_1, the subliminal message signal is commenced by generating a field sync signal in the field sync generator 29, which causes the electron beam to return to the top of the screen, followed by details of the subliminal message provided from the image generator 27. The subliminal message is encoded as a composite video signal so it is directly reproducible via a television receiver.

An important point to note is that the vertical size of the subliminal message is much less than a full picture height. One full image takes 20 milliseconds to display and then a further 20 milliseconds to erase. Such times are well within human conscious perception. However, suitable therapeutic subliminal messages do not have to fill the entire screen. A 10 millisecond image can fill approximately one half the screen, while a 5 millisecond image will fill approximately one quarter of the screen height.

To ensure that there remains no persistence of the subliminal image on the human subject, it is necessary to erase the image by overwriting it with another. The blanker unit 28 is provided for this and is enabled after a further sync pulse is generated by the field sync generator 29 which returns the electron beam to the point on the screen where the subliminal message commenced.

Most importantly, the subliminal image and the blanking image are not interlaced. The blanking image must overwrite the same lines that were used to display the subliminal image.

When the last line of the subliminal image has been erased by the blanking image, the timing and control block 26 resets the video switch 31 so that the input signal 21 is directly supplied to the output 32. It is important that the interlacing of the consecutive fields of the input signal 21 is maintained. Interlacing works in such a way that for any field, if the first line was a half line, then the last line must be a full line, and vice versa. The timing and control unit 26 must determine whether the field in which the subliminal message was displayed is even or odd and this is performed by the even field detector 25. Another approach would be to have the subliminal message being of one type either even or odd and using the timing and control unit 26 to wait until the correct field of the input

signal arrives. Alternatively, the point in time at which the video switch 31 is switched can be such that the last line, or the last few lines, of the same field of the input signal 21 appears at the output 32 before the next field synchronisation of the input signal 21.

It is further advantageous to have the erasure image overwritten by the next field of the input signal 21 so that the erasure image does not linger on the screen any longer than necessary. To achieve this, the erasure signal, and hence the subliminal signal, must be of the same interlace as the next field (n+1) of the input signal 21. This can be achieved if all fields of the subliminal signal begin and end with one type of line, either full or half, and if the next field of the input signal 21 also begins with the same type of line.

The rate at which the subliminal message is displayed is controlled by a dose manager 34 which enables the timing and control unit 26. The dosage rate for subliminal messages are not well understood by psychological researchers, and dosage rates can vary from the order of one dose every minute to one dose every few hours. When compared to the field rate of video displays, which is 50 times per second (60 times per second in the U.S.), it can be considered a very slow and isolated event and arguments as to the optimum dosage rate abound. However, such arguments are of no relevance to the operation of the system of Fig. 3 as those skilled in the art will appreciate that, using real-time clocks and the like, dosage rates varying from seconds to days or weeks can be readily achieved.

Fig. 4 shows an alternative arrangement which eliminates need for the blanker unit 28 and field sync generator 29 of the previous embodiment. In Fig. 4, a subliminal image system 40 is shown which receives an input composite video signal 41 which supplies a field timing unit 42, a line timing unit 43, an odd/even field detection unit 44 in a manner similar to the previous embodiment. A timing and control unit 45 is provided in a similar manner to the previous embodiment. In this particular embodiment, the subliminal message is retained in a digital image store 46 and converted to a video image by a converter 47 under control of the timing and control unit 45. A dosage manager 48 is provided in a manner as before.

In this embodiment, the subliminal message signal is output from the converter 47 to an audio restoration unit 49 which combines that signal with an audio component of the video input signal 41. Such a configuration maintains audio continuity of the composite video signal provided at an output 52. In this embodiment however, an clamp unit 51 is provided following from the video switch 50. The clamp unit 51 is enabled on completion of the display of the subliminal message to clamp any following (programme) video signals for an appropriate period of time to a minimum display level. That minimum display level is selected to ensure erasure of the subliminal message. After the subliminal message portion of the field has passed, the clamping is disabled thereby permitting the input signal to pass unhindered to the output 52.

In the embodiment of Fig. 3, it is apparent that a significant portion of the input

image is lost, corresponding to the bottom portion of the picture. This information is not refreshed until two fields later due to the interlacing. However, about half of this picture loss can be avoided if the arrangement of Fig. 4 is used. The arrangement of Fig. 4 has the distinct advantage of only requiring one rather than two extra field sync pulses within one field of the input signal 41, and of reducing the number of picture lines lost, which results in less perceptible interference with the original composite signal.

Also shown in Fig. 4 is an optional, but preferred, intensity detector and controller 53 which permits adaptive control of the brightness of the subliminal image and the clamp level. The controller 53 monitors the average luminance of the input signal 41 over that portion of the display where the subliminal image is to be displayed during the field that is to contain the subliminal message. The average of the luminance, or other mathematical manipulations thereof, is then used to control the brightness of the subliminal image. This ensures the subliminal image has sufficient brightness so as to achieve visibility over the input signal without the subliminal image being so bright that it may irritate the subject.

Fig. 1B shows a timing diagram similar to that of Fig. 1A but for the embodiment of Fig. 4 in which the subliminal signal 7 is placed at the end of the field (n) for a period T_S and the clamping of the signal 10 is active as indicated at 11 for a period T_S in the subsequent field (n+1).

The foregoing methods prefer that the subliminal message and erasure signal be of the same interlace to achieve appropriate erasure. However, the erasure signal may be of a different interlace and yet achieve acceptable performance. The extent to which the message signal remains visible to the observer in such situations is dependent on many considerations, such as the colour of the text (if appropriate) of each of the message and/or blanking signals, and any background colour, the persistence (age) of the phosphors of the video display, and the accuracy (beam width) of the electron guns of the video display.

There are limitations to the effectiveness of the above with some commercially available television (TV) receivers. Some TVs and video monitors will not execute the desired vertical flyback owing to the nature of the internal operation of the TV or monitor. However, to be described, are techniques to overcome these limitations, which require some background understanding of vertical deflection systems.

Although there exist many different circuits for implementing the vertical (or field) deflection of the electron beam(s) of TV or video monitors, most may be adequately described as follows, with reference to the functional block diagram of Fig 5.

A field oscillator 61 synchronises to incoming field synchronisation (Vsync) pulses 62, which, in the case of TV and some types of video monitors, are derived from the incoming composite video signal, or in the case of computer monitors conforming to standards such as MGA, CGA, EGA, and VGA (to name but a few), the Vsync pulses are

obtained directly from the video signals provided by the driving device, which is typically a computer.

The field oscillator 61 controls the charge/discharge circuit 63, which charges and discharges a field-charging capacitor 64, such that a sawtooth voltage 70, seen in Fig. 6, appears across the field-charging capacitor 64, which is synchronised to the incoming Vsync pulses. The sawtooth voltage 70 is then processed and amplified by a vertical deflection amplifier 66, and applied to vertical scan coils 67 of a cathode ray tube (CRT) of the TV or monitor. The current produced in the scan coils 67 causes the election beam in the CRT to scan from top to bottom down the screen while the picture detail is being written, then quickly fly-back to the top of the screen during the vertical flyback, ready for the next video frame or field. Typically, the current in the scan coils 67 follows the sawtooth voltage 70 across the field-charging capacitor 64 very closely in form, although the two waveforms may have different amplitudes, different offset level, and can also be inverted with respect to each other. It will be appreciated that in monochrome displays, a single electron beam is used, whereas in colour video displays typically three electron beams are used. Accordingly, throughout this specification, reference to an electron beam in the singular should also be construed as a reference to multiple electron beams in an appropriate display system. Furthermore, the location of the electron beam defines a momentary image displaying location on the display, which is scanned by horizontal and vertical scanning signals.

A linearity correction circuit 68 is required to ensure the electron beam moves at a constant velocity down the face of the picture screen. The details of such circuits are well known by those versed in the art, and are of no consequence to the operation of the present invention.

Some of the possible variations of vertical deflection systems include:

- the linearity (or S-correction) circuit 68 may directly affect the signal appearing across the field-charging capacitor 64, rather than the feedback to the vertical deflection amplifier 66;

- some of the functional blocks shown in Fig. 5 may be combined into circuits having no distinct functional boundaries. A common example is field oscillator circuits which include both the field charging capacitor 64 and the charge/discharge circuit 63. The vertical deflection amplifier 66 output stage may be implemented in many ways, including: single transistor, push-pull, class A, class AB, class B, class C, and even class D (also known as switchmode, of which there are numerous permutations).

A common feature of all vertical deflection systems is that each posses a signal which represents the vertical position of the electron beam upon the screen at any point in time. This signal is usually the sawtooth voltage waveform 70 that appears across the field-charging capacitor 64. It is the purpose of the remainder of the vertical deflection system to ensure that the electron beam follows the sawtooth signal 70.

Some field oscillators will not trigger on Vsync pulses which occur too soon after the previous Vsync pulse, and further, the remainder of the vertical deflection system, in particular the charge/discharge circuits 63, may not work satisfactorily in respect of the present invention.

However it is possible to overcome the limitations of existing vertical deflection systems by directly modifying the sawtooth voltage 70 via an external circuit, which implements embodiments of the present invention. By modifying the sawtooth voltage 70, the vertical position of the electron beam can be controlled in a desired manner, subject to the limitations of the remainder of the vertical deflection system.

Specifically as seen in Fig. 6, the sawtooth voltage waveform 70 includes a vertical flyback portion 71 and a vertical picture scan portion 72. The flyback portion 71 represents a portion where the electron on beam retraces from the bottom of the screen 73 to the top of the screen 74 where it commences new vertical picture scan 72. It should be noted that the sawtooth waveform 70 and subsequent waveforms have not been drawn to scale. In particular, the vertical flyback portion 71 generally takes about 500 microseconds and the vertical scan 72 about 19.5 milliseconds (for 25 frames/second interlaced).

Referring now to Fig. 7, a first modification 80 of the sawtooth waveform is shown which implements subliminal message display. In this embodiment, the vertical flyback 71 takes the electron beam to the top of the screen 74, shown in the image illustrated adjacent the waveform, where vertical picture scan 82 commences. Scan portion 82 displays the head portion of the cartoon character previously seen in Fig. 2. Rather than proceeding with the vertical picture scan portion 83, showing the neck and upper torso of the cartoon character, the sawtooth waveform 80 includes a sharp downward transition or advance 84 which represents a jump of the electron beam down the screen and omitting that portion of the display of the neck and upper torso of the cartoon character. A message portion 85 is then displayed which represents the desired subliminal message. Once the message has been displayed, a mini-vertical flyback 86 returns the electron beam to the position at the commencement of the message and corresponding to the position on the vertical picture scan 83 that the electron beam would have been on had the deviations 84 and 85 not taken place. After the mini-vertical flyback 86, an erasure signal 87 is displayed over the subliminal message signal and on completion of same, the vertical picture scan 88 is used to display the remainder of the cartoon character, in this case the lower legs. This proceeds until the sawtooth waveform 80 reaches the bottom of the screen 73, whereupon another vertical flyback 71 takes place.

It will be appreciated that the arrangement of Fig. 7 permits the subliminal message to be displayed without forcing upon the television display a full and unnecessary vertical flyback. The only cost in terms of display quality is that the downward vertical advance 84 represents a loss of the image being displayed. However, that portion of the image

lost will be overwritten on the next vertical scan which, for interlaced displays is only half a field or one fiftieth of a second away (in the Australian PAL system).

A further embodiment is shown in Fig. 8 where a waveform 90 includes standard image picture scan portion 91 which is immediately followed by display of the subliminal message 92. When display of the message 92 is completed, a mini-vertical flyback 93 occurs which permits an erasure signal 94 to write over the subliminal message signal. A vertical advance 95 is then required to return the electron beam to its appropriate position down the screen so as to permit the display of the remainder of the image 96.

In Fig. 9, a sawtooth waveform 100 is shown which enables the message and erasure signals to be written as before, and then overwritten with the desired program material. In this arrangement, image signal 101 is displayed which, as illustrated, displays the head and neck of the cartoon character. A downward advance 102 occurs omitting the body portion of the cartoon character. This is immediately followed by the subliminal message signal 103, a mini-vertical flyback 104, display of an erasure signal 105 and a further mini-vertical flyback 106. The erasure signal 105 is then retraced by the remaining portion of the program material 107 which thereby acts to display the remaining portion of the cartoon character. This embodiment acts to overcome a deficiency of the previous embodiments which lay in the erasure signal being displayed for a not insignificant period of time. In the embodiment of Fig. 9, the erasure image is retraced with the normal programme material image which acts to ensure that the only image perceived by the viewer is that of the program material and not of the subliminal message or its erasure image.

The embodiment of Fig. 10A illustrates a sawtooth waveform 110 configured to provide minimum vertical jitter of the image as seen by the observer where the subliminal message is placed near the bottom of the display. This is a special case of the embodiment described in Fig 8 by virtue of the vertical location of the message. The normal programme image signal 111 is displayed, followed by the message signal 112. When the drawing of the message is completed, a mini-vertical retrace 113 returns the electron beam to the screen position of the start of the message 112, at which time an erasure image 114 is written over the message so as to render the message unintelligible or otherwise indistinguishable by the human viewer. The end of the erasure signal 114 is timed to coincide closely with the next vertical retrace 71. A vertical advance 115 may be required to drive the sawtooth waveform 110 down to the bottom of the screen so as to cause the TV receiver or video monitor to execute the vertical retrace 71.

The embodiment of Fig 10B illustrates a sawtooth waveform 200 configured to provide minimum vertical jitter of the normal programme image as seen by the observer where the subliminal message is displayed at the top of the screen. Here, the normal programme image signal 201 is displayed for most of the field. Before the end of the field, a vertical retrace 202 is executed which returns the electron beam to the top of the

screen, at which point the message 203 is displayed. When the Vsync signal of the normal programme material is detected, another vertical retrace 204 is executed, which coincides with the vertical retrace 71 that would have been executed had the sawtooth waveform not been modified. The electron beam is now positioned at the top of the screen again, and can write over the message with an erasure image 205. This erasure signal may be simply the programme signal 201, or a modification thereof, so long as at the completion of the erasure signal 205 the message is erased or otherwise made unintelligible or indistinguishable to the observer. At the end of the erasure signal 205, the normal programme signal 201 is again displayed.

The embodiment of Fig 10C illustrates a sawtooth waveform 210 which is configured to provide minimum vertical jitter of the normal programme material, although a large part of one field of the normal programme material may be suppressed from being displayed. Such an embodiment may be more easily implemented than some of the other embodiments discussed above. This embodiment has similarities with the embodiment illustrated in Fig 8. Here, the normal programme material 91 is displayed which is immediately followed by display of the message 92. When the display of the message 92 is completed, a mini-vertical flyback 93 occurs which places the electron beam at the start position of the message 92, and allows an erasure signal 94 to write over the subliminal message 92. At the end of the erasure signal 94, the position if the electron beam is advanced down the screen as normal, however the electron beams are turned off so that no picture is written for the remainder of the field, 211. When the Vsync signal of the normal programme material is detected, a normal vertical retrace 71 is executed. A vertical advance 212 may be required to drive the sawtooth waveform 210 down to the bottom of the screen so as to cause the TV receiver or video monitor to execute the vertical retrace 71.

Fig. 11 illustrates a further embodiment of a waveform 120 which is theoretically feasible but practically difficult in modern television receivers. In this arrangement, program material 121 is displayed which is followed immediately by message signal 122 at the bottom of the screen. In place of a standard vertical flyback 71, a mini-vertical flyback 123 returns the signal to the commencement of the subliminal message whereupon an erasure signal 124 is used to overwrite the message signal. The image then returns with an inserted vertical flyback 125. This arrangement uses a vertical flyback sequence to insert the erasure and, depending on the length of the message signal and erasure, a vertical jitter may be observed in the display.

The embodiments of Figs. 7 to 11 can be implemented by modifying the charge/discharge unit 63 of Fig. 5 in the manner described below..

Fig. 12 illustrates a charge/discharge unit 130 which includes the charging capacitor 64 shown in Fig. 5, current sources 131 and 132, and a switch 133 which act to form the charge/discharge unit 63 of Fig. 5. It will be apparent to those skilled in the art that the

current source 132 acts to discharge the capacitor 64 which provides the downward ramp of the sawtooth waveform 70 shown in Fig. 6. When the switch 133 is closed by the field oscillator 61, the current source 131 acts to charge the capacitor 64 providing the upwardly sloping ramp or vertical flyback 71 of the sawtooth waveform of Fig. 6. It will also be appreciated that as the current source 132 remains in circuit at all times, the current source 131 must be generally of a substantially greater magnitude than the current source 132 so as to ensure the vertical flyback occurs within the appropriate time limits.

Each of the embodiments of Figs. 7 to 11 are implemented by altering the voltage on the capacitor 64 and each of the variations shown in those embodiments can be implemented by the addition to two further current sources 135 and 136 with respective electronic switches 137 and 138. In particular, the switches 137 and 138 are configured such that neither is closed at the same time but rather, so as to implement the required downward vertical advances and mini-flybacks referred to above.

In all cases where the switches 137 and 138 operate, the switch 133 remains open. In some applications the source 135 and switch 137 can be omitted and the switch 133 operated directly from the controller 142.

For example, if it is desired that the electron beam rapidly advance down the screen, as in the sawtooth portions 84, 95 and 102, the switch 138 is closed whereupon the current source 136 acts to draw additional current from the capacitor 64 reducing the voltage thereupon. The current source 136 is therefore generally of substantially greater magnitude than the current source 132. Once the appropriate advance is obtained, the switch 138 is opened. Similarly, when a mini-flyback is required, such as in the sawtooth portions 86, 93 ,104 and 106, the switch 137 is closed whereupon the current source 135 acts to pass current into the capacitor 64 to charge same to a higher voltage thereby retracing the electron beam to a previous position.

Each of the switches 137 and 138 are controlled by timing and controlling apparatus forming part of the subliminal message system either configured within or being attached to a television receiver or some other form of raster display. The magnitudes of the current sources 135 and 136 are dependent upon the length of time required to display the desired subliminal message and implement the required mini-flyback.

The current sources 135,136 and switches 137,138 form part of a subliminal message display system the remainder of which is shown to the left thereof in Fig. 12. The system includes a processor 139 which is supplied with a program signal component 144 derived from a input composite video signal 150. A timing signal extractor 146 extracts timing signals 148 from the input composite video signal 150 which are also supplied to the processor 139. Processor 139 includes a real-time clock 140 which supplies a dosage programmer 141. The role of the dosage programmer is for the user of the subliminal message display system to program an appropriate dosage rate, for example, one dose every five minutes. The dosage programmer 141 thereafter utilises the

output of the real-time clock to determine the passage of time and to output a dose signal to a main controller 142. The processor 139 also includes a switch 145 which is configured to switch an output signal to be displayed 149 between the input program signal 144 and a subliminal/erasure signal 151 derived from a portable memory storage media 143, such as a memory card, video tape, video disc or other like device, that is insertable into the processor 139. In this configuration, the memory storage device 143 is input to the processor 139 and when a dose is initiated upon the controller, the controller acts to operate to switches 137 and 138 to achieve a desired vertical scan regime as per the embodiments of Figs. 7 to 11.

Using the example of Fig. 7, upon the receiving the dose signal, the controller 142 acts to close the switch 138 so as to cause the vertical picture scan to provide a downward advance of the electron beam. Once that downward advance is completed, the switch 138 is opened at which time the controller 142 enables the selection of the subliminal message from the memory storage device 143. Simultaneously, the switch 145 is switched to connect the subliminal signal via connection 151 to the signal output to the displayed 149. Alternatively, the subliminal signal can add, subtract, multiply, or in any other way , modulate or be mathematically combined, blended or juxtaposed with the input programme signal 144 to allow the display of the subliminal message. Once the subliminal signal has been displayed, the controller 142 actuates the closure of switch 137 which causes a mini-flyback. On completion of the mini-flyback, the switch 137 is opened and the controller enables the selection of the erasure signal from the memory storage device 143. This is output via the switch 145 and displayed to retrace previously displayed subliminal message. Upon completion of the display of the erasure signal, the switch 145 is again switched to connect the program signal 144 to the signal to be displayed 149.

The specific advantage of using memory storage device 143 for the retention of the subliminal and erasure signals, is that a user may have a selection of various subliminal messages which, depending upon the type of psychological treatment desired, can be inserted into the processor 139 as required. Furthermore, the use of such an arrangement permits the display of subliminal messages over any input program material, such as broadcast or cable video material, a computer display or for pre-recorded source material such as video tapes. In this manner, individual users may choose to subject themselves to subliminal messages and manufacturers may manufacture appropriate equipment for private sale without fear of statutory regulation.

In a preferred configuration, the subliminal display system of Fig. 12 can be fully integrated into a television receiver, or video monitor which would thereby satisfy safety requirement in view of most modern television receivers being double insulated and powered directly from mains supply. However, where appropriate safety measures are taken and the additional switches 137 and 138 of Fig. 12 suitably isolated from the

processor 139, the processor can be configured as an independent unit connectable to a appropriately modified or constructed television receiver.

Ideally, in the memory storage device 143, the erasure signal is prematched to the particular subliminal signal for which it is required to erase. For example, the colour of the erasure signal can be selected such that it perceptually obscures the colour of the subliminal message signal. Also, the erasure signal, can be arranged to redisplay the same subliminal signal but with a different colour scheme, for text and background. Where appropriate, more than one subliminal and/or erasure signals can be provided on a single memory storage device 143 provided the controller 142 is configured to select an appropriate combination or combinations of the subliminal and erasure signals. For instance, one such subliminal signal may be "don't eat" is for psychological programming of overweight persons and another may be "don't smoke" which would be useful for the psychological programming of smokers. Those persons afflicted with both conditions may choose to subject themselves to both forms of subliminal messages essentially simultaneously, for example at five minute intervals for each dose.

It will be apparent from the foregoing that the location of the message can be anywhere on the screen. Unless the horizontal deflection system has been tampered with, the message is restricted to occupying a horizontal band on the screen, the vertical location of which is unconstrained.

A further development of the invention involves the speed with which the electron beam is deflected in the vertical direction as it writes then erases the subliminal message, being different from the normal deflection rate during normal vertical scan operation. For example, the rate during writing of the message can be made faster to make the message fainter, while during erasure the rate can be slower to increase the intensity of the erasing image and hence ensure complete erasure of the subliminal message/image.

As stated above, the existing vertical deflection system of the TV or monitor may have to be modified to allow the system to respond to the inserted vertical flyback. Further, depending on the level of modification, control over the vertical position of the electron beam may be more sophisticated than simple return to vertical origin. This would allow the placement of the message at any vertical position.

As a result of the above modification of the existing vertical deflection system may be required to minimise the adverse effects of the inserted vertical flybacks. Such adverse effects may include "ringing" or damped oscillation of the vertical origin, such that the picture appears to bounce in the vertical direction. Many techniques can be employed to reduce the effect of such bounce to imperceptible levels. Such techniques include, but are not limited to:

(a) introducing electrical components and/or circuits in the vertical deflection coil circuit to inhibit undesirable modulations of the current in the coil. Such components and/or circuits may be known by those versed in the art as "snubbers", "clamps", or

"dampers",

(b) introducing a compensating signal to the input of the vertical deflection system, which when added to the signal that effects the subliminal exposure, results in the desired subliminal exposure without the picture bounce;

(c) the compensation signal may be incorporated into the signal which effects the subliminal exposure. ie: incorporating both the subliminal signal and the compensating into one signal.

In a further refinement, display of the subliminal message can be delayed for any number of picture fields following switch over from the supraliminal program source, if so desired. During this delay, any type of picture can be displayed, including but not limited to, a single colour blank image. The viewer will be aware of this delay and any image used during the delay, depending on the number of fields for which the subliminal message is delayed.

The motivations for the inclusion of this delay are:

(a) the possibility that the effect of the subliminal message upon the viewer is somehow enhanced or in some other way desirably modified. This would be particularly applicable if the image presented during the delay was designed to enhance the reception and effect of the subliminal message. (for example, alpha-wave stimulation); and

(b) the desire to warn the viewer of the imminent occurrence of the subliminal message. This may be desirable, or it may be required by law.

The timing of the occurrence of the subliminal exposure can be controlled or varied as desired to enhance the effect of the subliminal message upon the viewer.

The erasure signal can be constructed in such a manner as to more completely erase the subliminal message. For example, should a simple signal of constant intensity be used for erasure, then the phosphor picture elements (pixels) previously excited by the subliminal message would receive a second excitation by the electron beam from the erase signal. These phosphor pixels would emit light of higher intensity, and most likely for longer duration, than the pixels which were not excited by the subliminal message. The result is that the message may be consciously perceived.

It is preferred that, during the erase phase, those pixels that were already excited during the message write phase, are to be excited less than those pixels not excited during the message write phase. The difference in the excitation is to be such that, at the conclusion of the erase phase, all pixels in each horizontal line in the region of the subliminal message are emitting the same amount of light. Thus, at the end of the erase phase, the region of the subliminal message appears as a uniformly illuminated band of light.

The foregoing describes only a number of embodiments of the present invention, and modifications, obvious to those skilled in the art can be made thereto without departing from the scope of the present invention. For example, the present invention can be applied to any one of the PAL, NTSC or SEACOM systems, as well as for non-interlaced raster display arrangements. Also, non-electron tube displays, such as rasterised liquid crystal displays (LCD's) can be controlled in accordance with the present invention. In such embodiments, it will be apparent that rather than providing electronics

to cause additional control of an electron beam and it's momentary image displaying location, additional computer programming is required to achieve appropriate addressing of pixels in such displays. Such displays can include colour LCD's using an red (R), green (G), blue (B) colour format, or ferroelectric LCD's which use an RGBW (red, green, blue, white) format.

CLAIMS:

1. A method of displaying a subliminal message to an observer upon a rasterised display, said method comprising the steps of displaying a video source material comprised of a plurality of sequential fields, displaying a subliminal message for a portion of one of said fields, and immediately following display of said subliminal message, erasing said subliminal message from display prior to recommencement of uninhibited display of said video source material.

2. A method as claimed in claim 1 wherein said subliminal message replaces said video source material during said portion.

3. A method as claimed in claim 1 wherein said subliminal message and said video source material are blended together during said portion such that an image displayed represents a mixing of, or juxtaposition of, said subliminal message and said video source material.

4. A method as claimed in claim 1, wherein the erasure of the subliminal message is performed by retracing the subliminal image with an erasure image.

5. A method as claimed in claim 1, wherein the erasure of the subliminal message is performed by clamping, to a minimum illumination intensity sufficient to occlude said subliminal message, that corresponding portion of the field following the subliminal message.

6. A method as claimed in claim 1, wherein at least one of the display of the subliminal message and the erasure of same is preceded by at least a partial vertical retrace of the rasterised display.

7. A method as claimed in claim 6, wherein the vertical retrace returns a momentary image displaying location to the commencement of the message signal.

8. A method as claimed in claim 6, further comprising the step of advancing a momentary image displaying location on said rasterised display to account for time required to perform erasure of said subliminal message.

9. A method as claimed in claim 8 wherein said advance occurs either before display of said subliminal message, or after erasure of said subliminal message.

10. A subliminal image display system for reproducing a subliminal message on a display, said system comprising:

a video processor configured to provide an output of said processor system determined from a source material video input signal and a message signal obtained from an image generator and containing said subliminal message;

a video timing detector arranged to extract synchronisation signals from said input signal;

a controller arranged to control said processor to cause display of said message signal in a field of said input signal in a predetermined manner; and

an erasure arrangement configured to erase said subliminal message

immediately after display of same.

11. A system as claimed in claim 10, wherein said erasure arrangement comprises circuitry configured to return a momentary display location, subsequent to display of said message signal, to a location at the commencement of display of said message signal so as to permit erasure of same.

12. A system as claimed in claim 10, wherein the erasure arrangement comprises a device configured to clamp a display intensity of the input signal displayed subsequent to said message signal at display locations corresponding to said message signal.

13. A system as claimed in claim 10, wherein said erasure arrangement further comprises an erasure signal configured to overwrite said subliminal message prior to further display of said input signal.

14. A system as claimed in claim 10, wherein at least said message signal is retained in a permanent storage device configurable for retrieval by said system.

15. A system as claimed in claim 14, wherein said storage device is portable and removably insertable into said image generator.

16. A system as claimed in claim 11, wherein display is a cathode ray tube display and said circuitry functions to alter a vertical scan signal of said display to cause a minor retrace of an electron beam to the commencement of said subliminal message.

17. A system as claimed in claim 16, wherein said circuitry functions to advance said electron beam, either before display of said subliminal message, or after erasure of same, down said display so as to compensate for time taken to display and erase said subliminal message.

18. A system as claimed in claim 17, wherein said display comprises a vertical scan device, a voltage upon which being representative of a vertical location on said display of said electron beam, and said circuitry comprises first means for increasing the voltage on said vertical scan device, and second means for decreasing the voltage on said vertical scan device.

19. A system as claimed in claim 18, wherein said vertical scan device comprises a field-charging capacitor of a television display and said first and second means each comprise switchable current sources selectively connectable to said capacitor.

20. The invention as claimed in claim 1 or 10, wherein the subliminal message comprises text and/or an image that is displayed.

21. The invention as claimed in claim 1 or 10, wherein said blanking signal comprises text and/or an image that is displayed.

22. A portable storage device containing a subliminal message adapted to be displayed using the invention as claimed in claim 1 or 10.

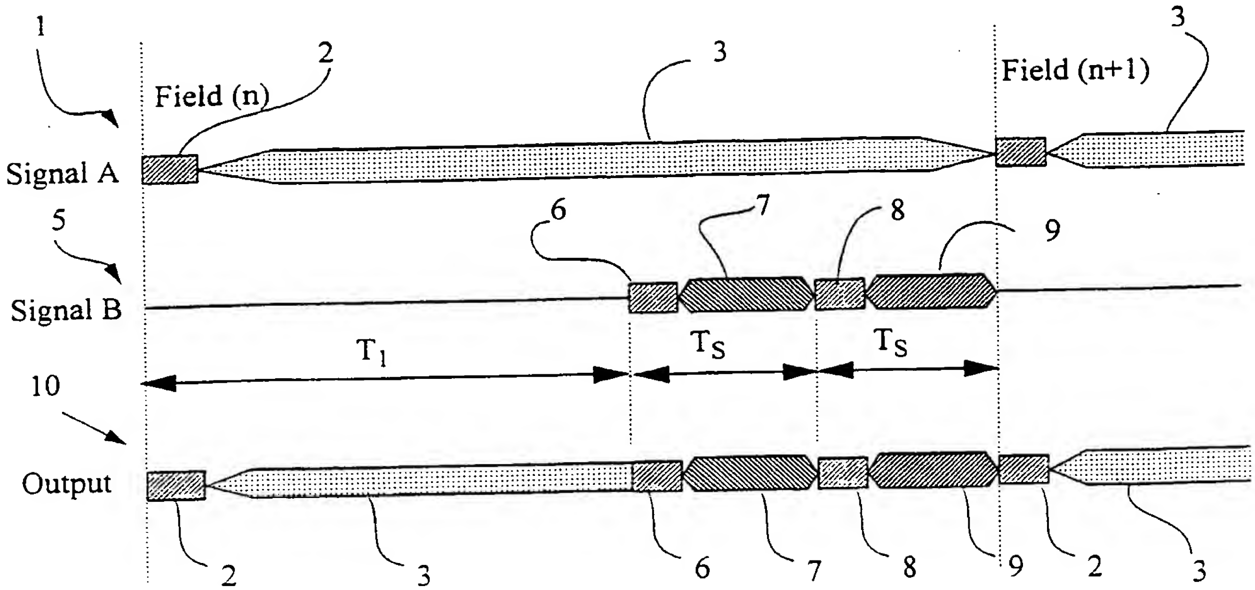

1
Field (n)
2
3
Field (n+1)
3
Signal A
5
6
7
8
9
Signal B
T1
TS
TS
10
Output
2
3
6
7
8
9
2
3

Fig. 1A

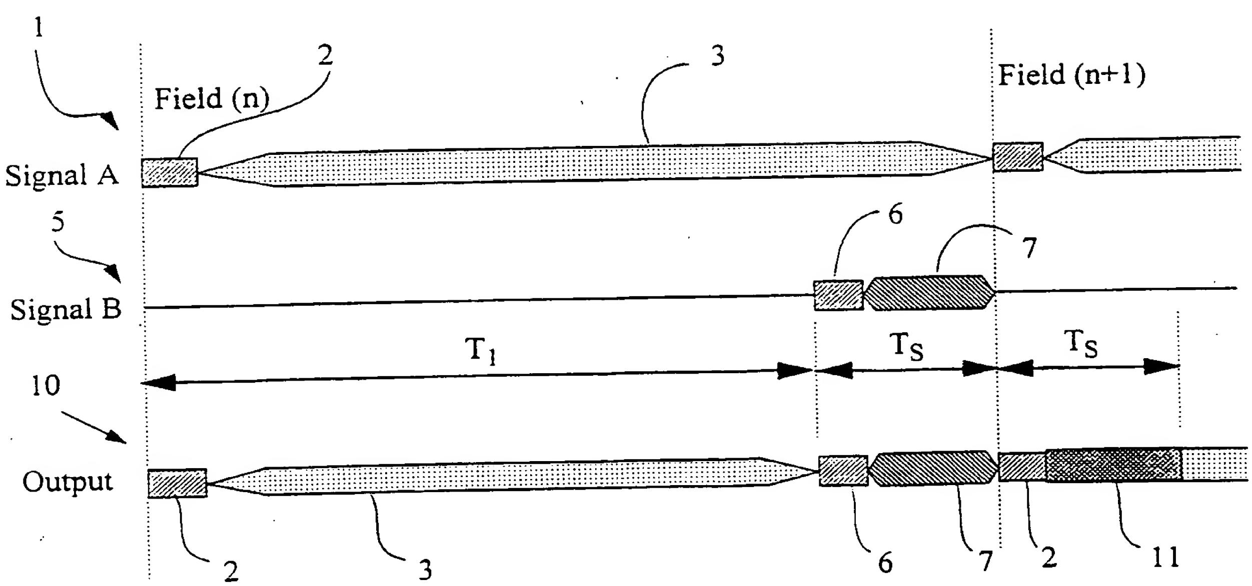

1
Field (n)
2
3
Field (n+1)
Signal A
5
6
7
Signal B
T1
TS
TS
10
Output
2
3
6
7
2
11

Fig. 1B

Field (n-1)

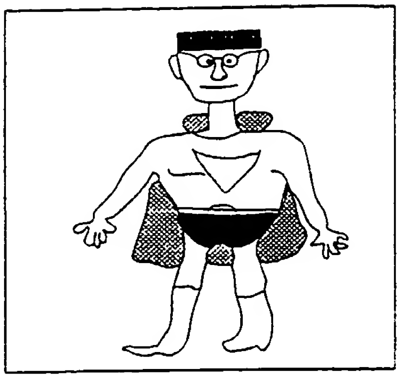


Fig. 2A

Field (n) @ $t=T_1$

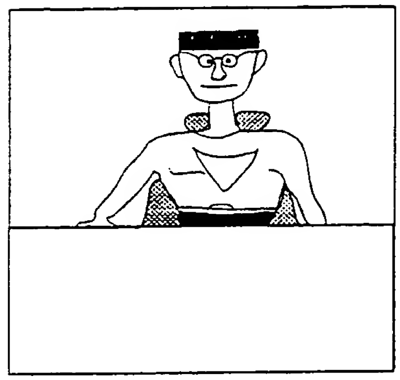


Fig. 2B

Field (n) @ $t=T_1+T_S$

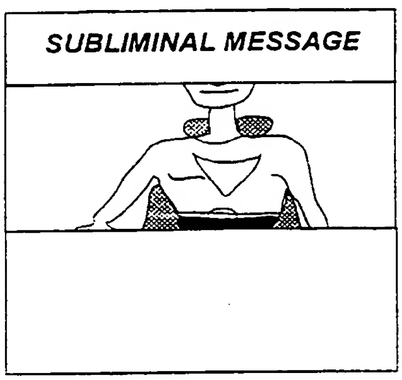


Fig. 2C

Field (n) @ $t=T_1+2T_S$

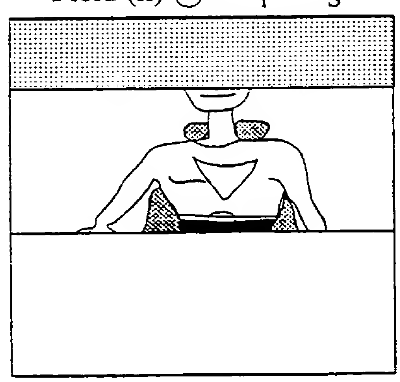


Fig. 2D

Field (n+1)

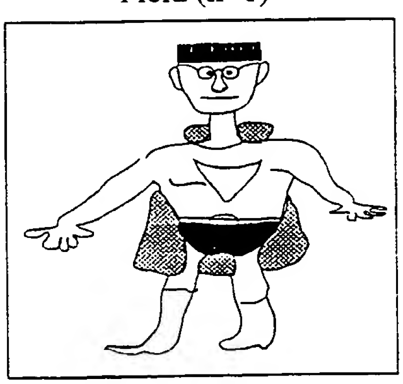


Fig. 2E

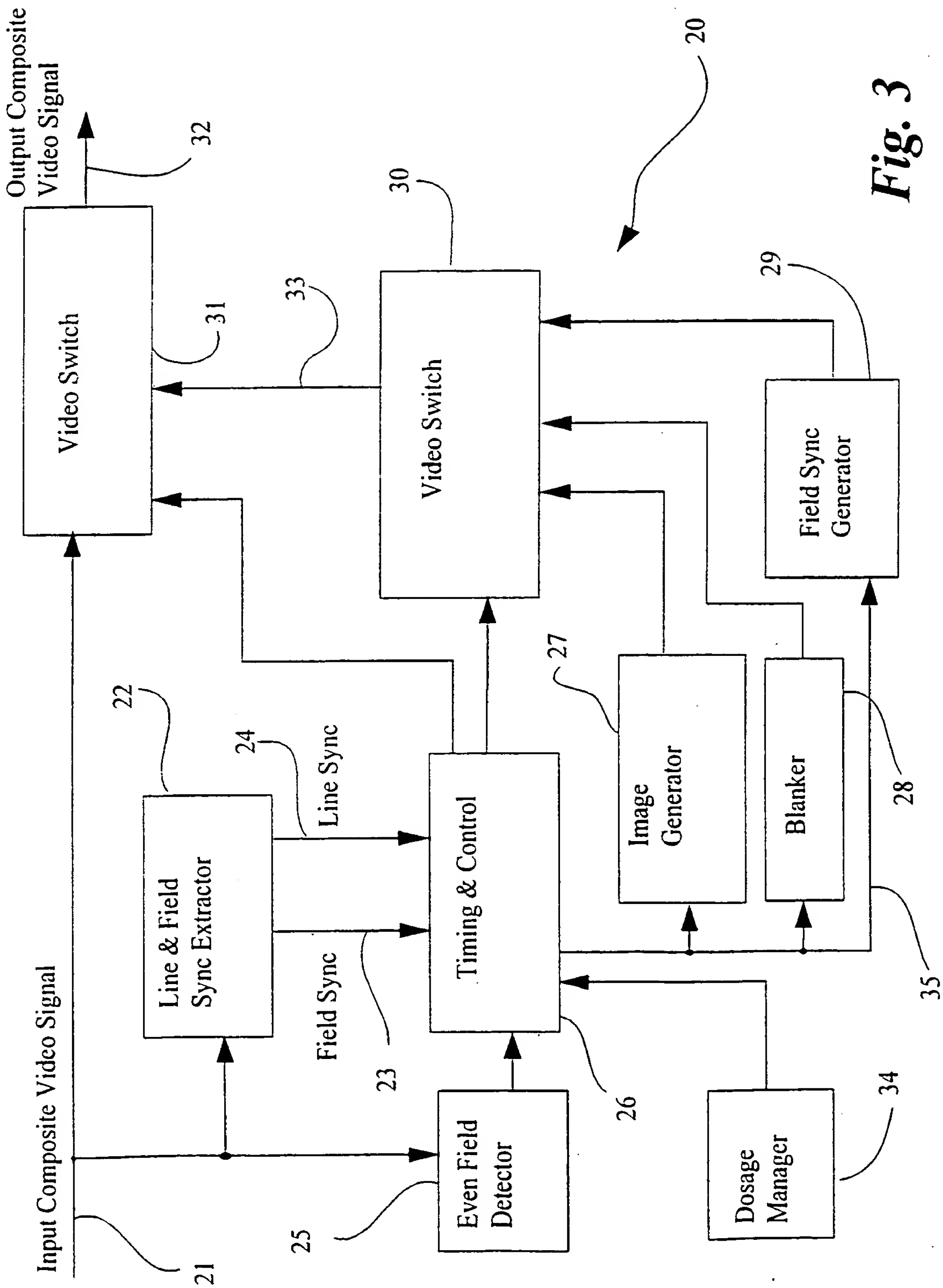

Output Composite Video Signal
32
Video Switch
31
33
30
Video Switch
20
29
Field Sync Generator
Line & Field Sync Extractor
22
24
Line Sync
Timing & Control
27
Image Generator
Blanker
28
Field Sync
23
26
35
Input Composite Video Signal
21
25
Even Field Detector
Dosage Manager
34

Fig. 3

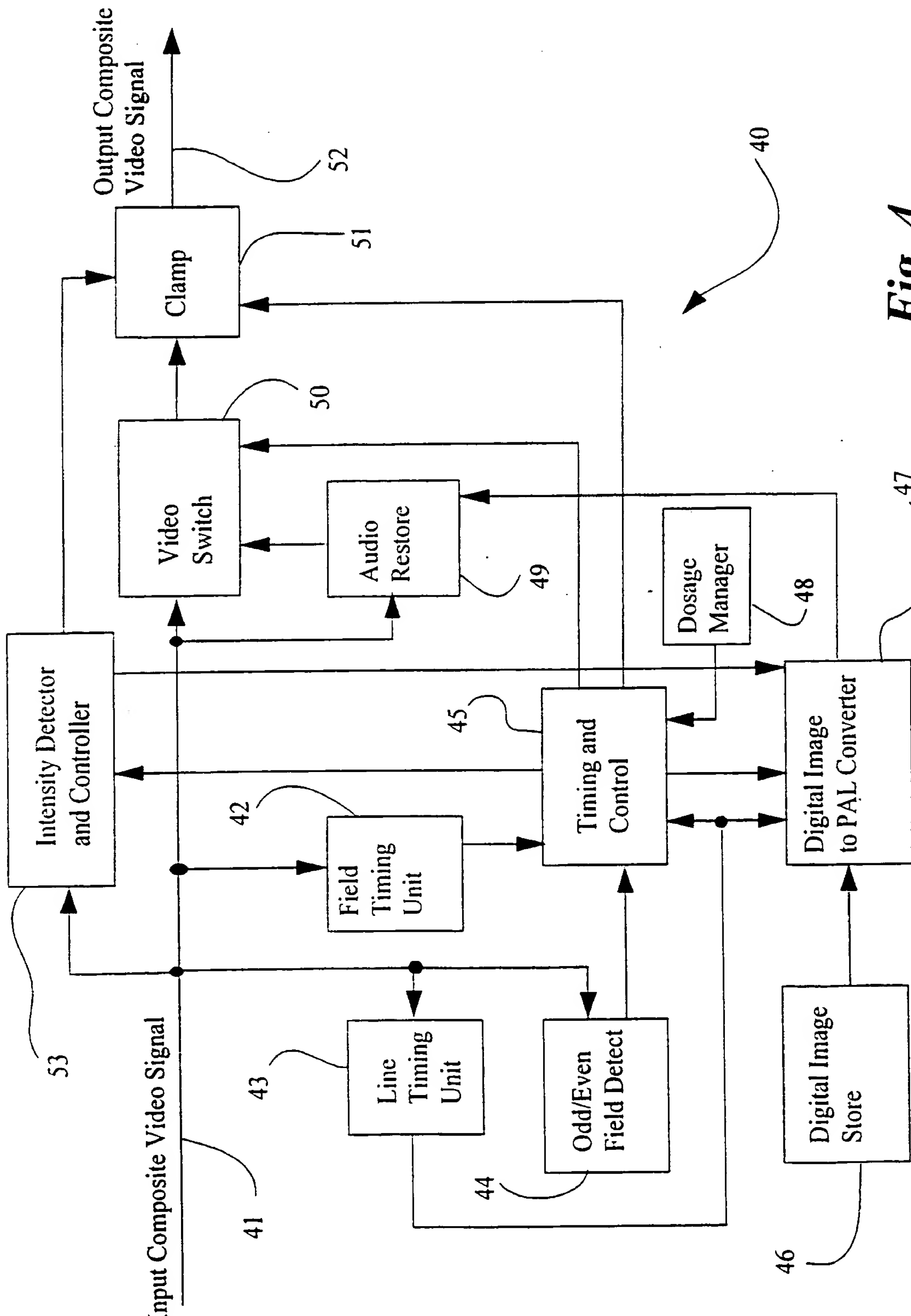

Output Composite Video Signal
Clamp
Video Switch
Audio Restore
Dosage Manager
Intensity Detector and Controller
Timing and Control
Digital Image to PAL Converter
Field Timing Unit
Line Timing Unit
Odd/Even Field Detect
Digital Image Store
Input Composite Video Signal
40
41
42
43
44
45
46
47
48
49
50
51
52
53

Fig. 4

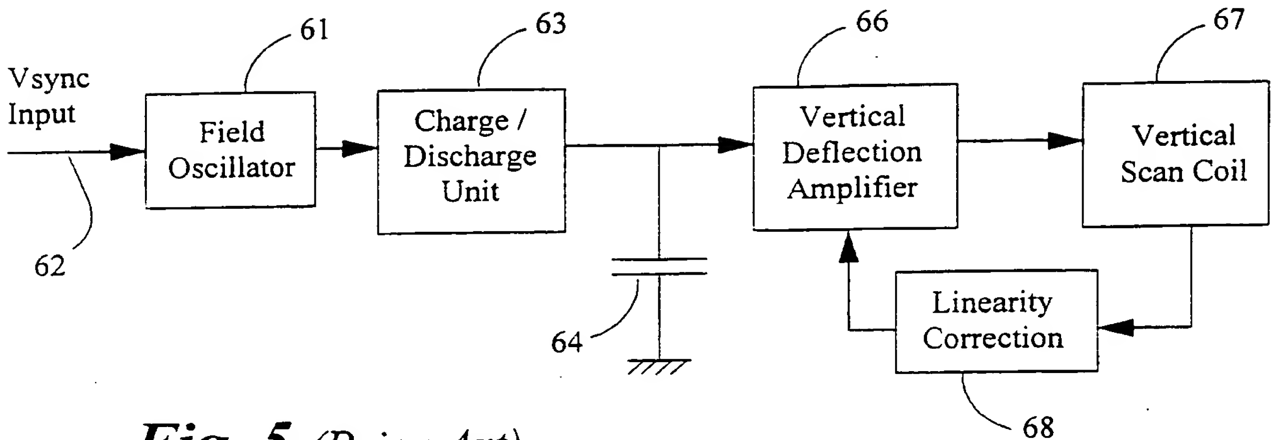


Fig. 5 (Prior Art)

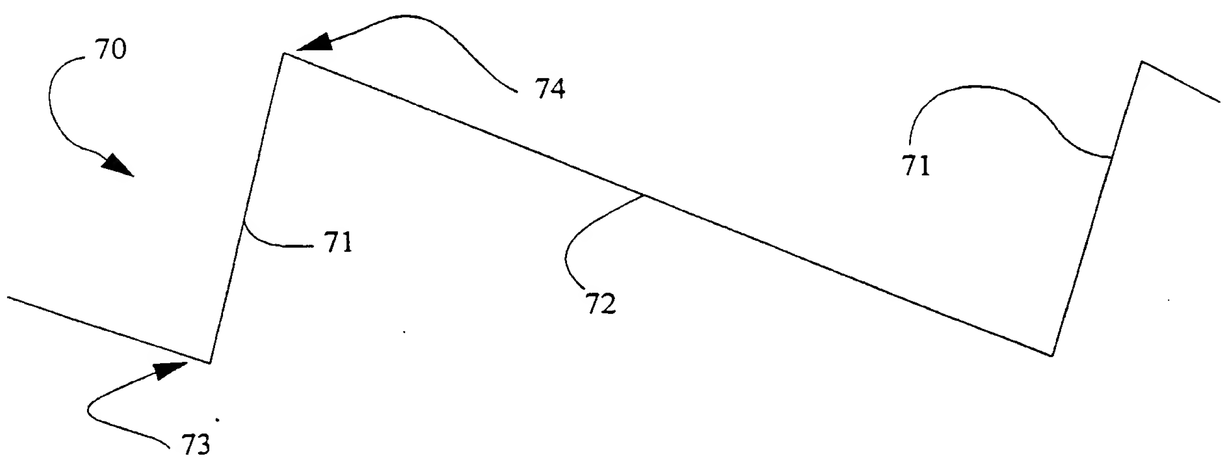


Fig. 6 (Prior Art)

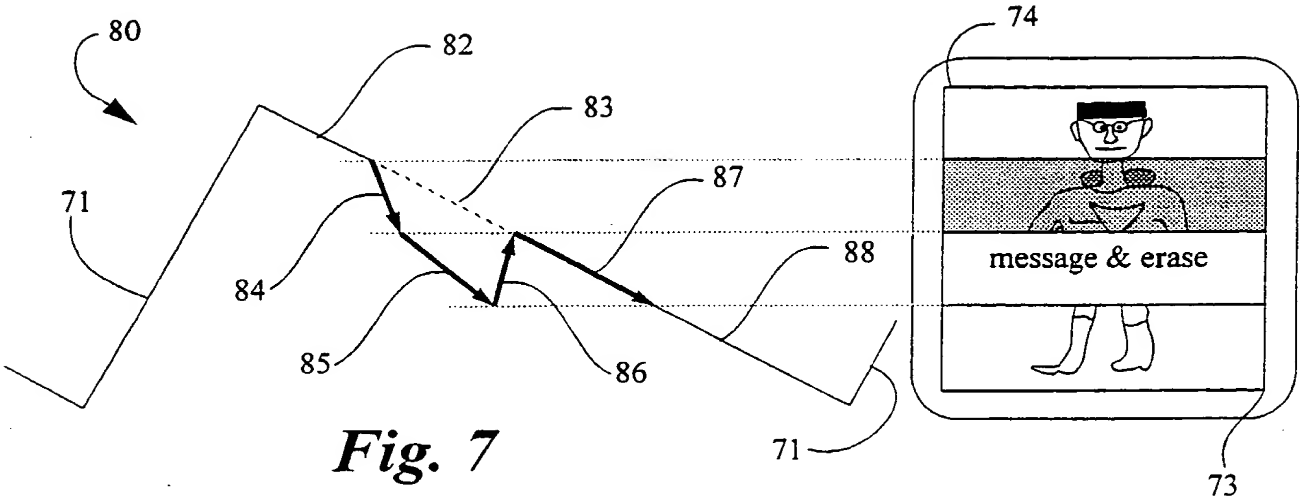


Fig. 7

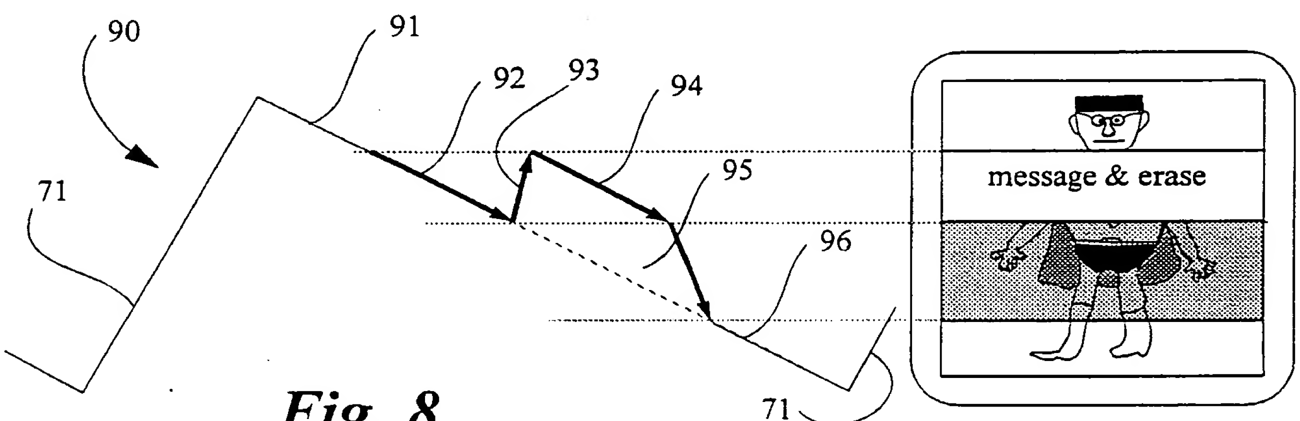


Fig. 8

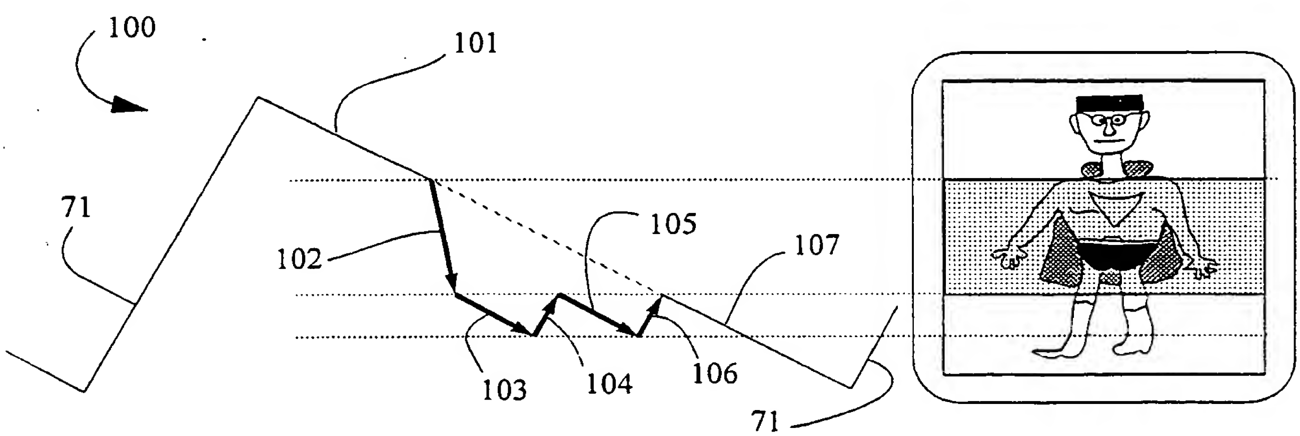


Fig. 9

Fig. 10A

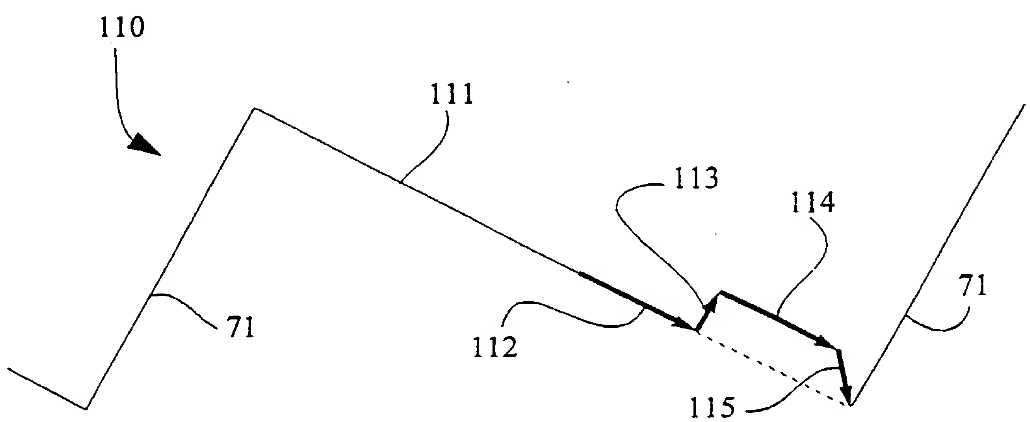


Fig. 10B

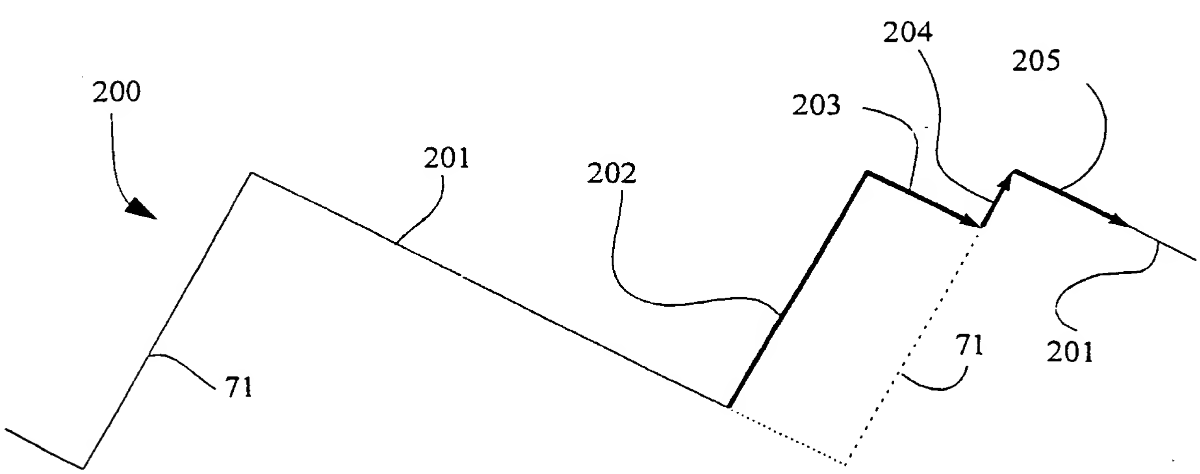


Fig. 10C

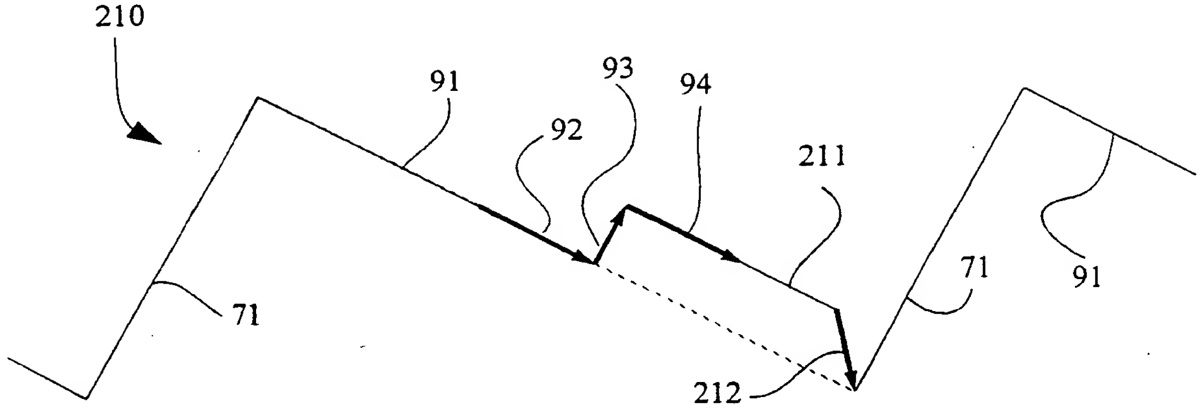
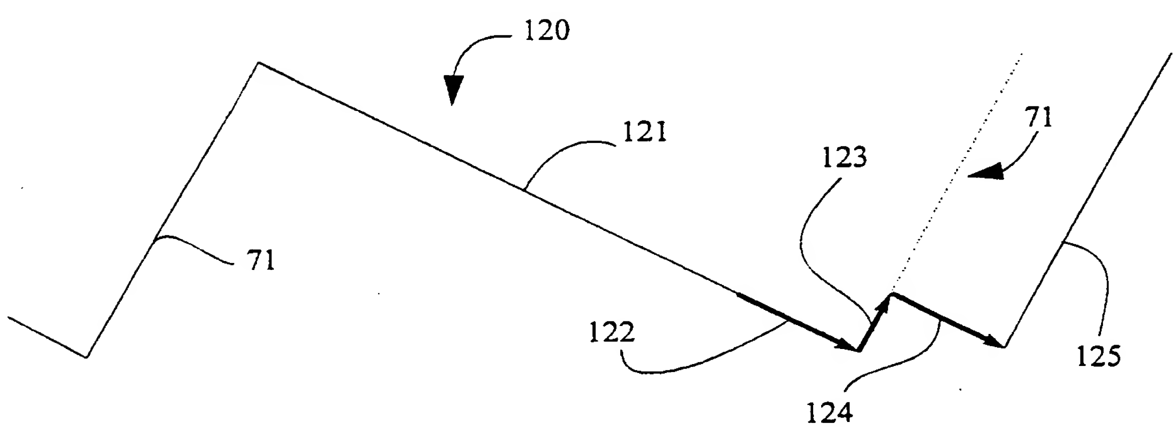


Fig. 11



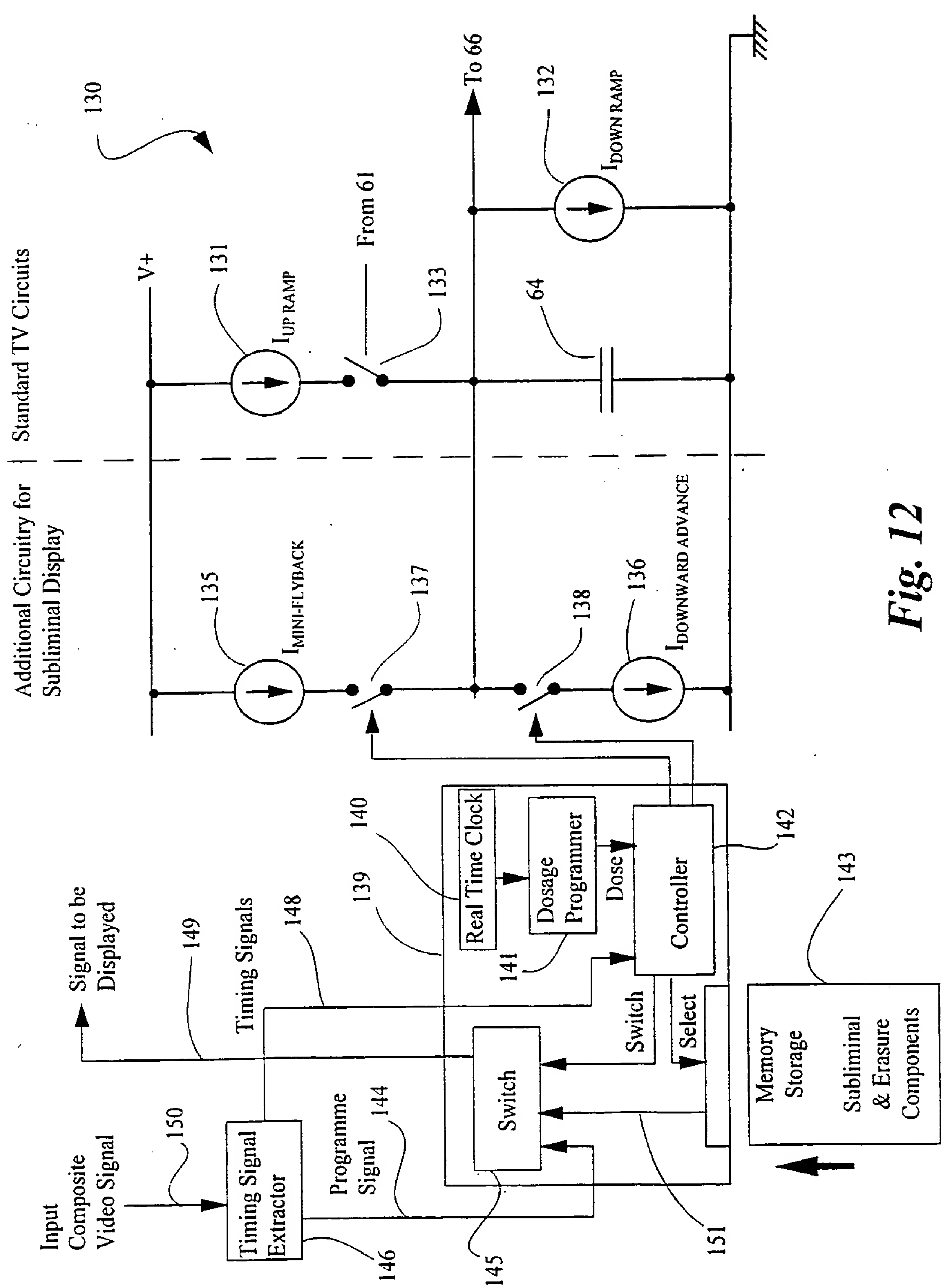

130
Standard TV Circuits
Additional Circuitry for Subliminal Display
V+
131
I UP RAMP
From 61
133
To 66
132
I DOWN RAMP
64
135
I MINI-FLYBACK
137
138
136
I DOWNWARD ADVANCE
Signal to be Displayed
149
Timing Signals
148
139
140
Real Time Clock
Dosage Programmer
141
Dose
Controller
142
143
Memory Storage
Subliminal & Erasure Components
Switch
Select
Switch
151
145
Programme Signal
144
150
Input Composite Video Signal
Timing Signal Extractor
146

Fig. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 94/00225

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl.[5] H04N 5/445, 5/262, 5/265

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC H04N 5/445

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above

Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A, 5194008 (MOHAN et al.) 16 March 1993 (16.03.93) column 4 line 13 - column 5 line 42, abstract.	
A	US,A, 5128765 (DINGWALL et al.) 7 July 1992 (07.07.92) Abstract, column 3 lines 55-68, Fig. 2	
A	US,A, 5027208 (DWYER, Jr. et al.) 25 June 1991 (25.06.91) Fig.2, column 5 line 54 - column 6 line 19	
A	US,A, 5017143 (BACKUS et al.) 21 May 1991 (21.05.91) Figs. 1-3, column 2 lines 37-45, column 3 line 40 - column 4 line 36	

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
19 July 1994 (19.07.94)	29 July 1994 (29.07.94)

Name and mailing address of the ISA/AU	Authorized officer
AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. 06 2853929	P.P. GERONDAL Telephone No. (06) 2832174

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
A	US,A, 4616261 (CRAWFORD et al.) 7 October 1986 (07.10.76) column 1 line 57 - column 3 line 3	
A	US,A, 4006291 (IMSAD) 1 February 1977 (01.02.77) Abstract, column 2 lines 52-65	
A	US,A, 3278676 (BECKER) 11 October 1966 (11.10.66) Whole document	
A	GB,A, 2238687 (POPELL INDUSTRIES) 5 June 1991 (05.06.91) page 2 lines 9-16, page 9 lines 19-30, Fig. 3c.	

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	5194008	AU	34079/93	EP	562327	JP	6042900
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